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EDUCATION AND EXPLORATION BY THE AMERICAN MUSEUM

THE report of President Henry Fairfield Osborn, of the American Museum of Natural History, for the year 1921 is a concise recountal of the accomplishments of the institution and records the firm establishment of the policy inaugurated in 1917—the policy of a broader and more varied service calculated to prove of scientific and educational value, not alone to the citizens of New York, but also to those of the entire nation.

The most conspicuous event of the year last past was a favorable attitude adopted by the city administration toward this institution—the decision to begin the construction of additional wings which have been urgently needed for more than fifteen years, but which because of the war and the high cost of building immediately following, it was found impracticable to start before the current year. At a meeting of the Board of Estimate and Apportionment, held on December 26, 1921, the sum of $1,500,000 was unanimously voted to erect the southeast wing on Central Park West and the southeast court building adjacent thereto as planned in 1875. In providing these additional halls, the city administration is liberally supporting the public educational activities of the museum's work. During the past year the museum, which serves alike the schools of the five boroughs, reached 1,500,000 school children, 869 natural history collections were in use among the elementary schools. This is exclusive of the number of lantern slides distributed which illustrate the work of the museum in all parts of the globe and provide the latest accepted methods of visual instruction in geography, zoology, forestry and history, totaling 210,000, or a service of 182 schools. The number of schools reached outside the museum was 477 in all of the boroughs, and the number of scholars was 1,247,515. By the methods initi-

ated in this museum, the observations and results of its field workers in Australia, Asia, South America, Africa, Polynesia and Western Europe are made acceptable to the use of the teachers of our public schools in less than twelve months, and this phase of the museum's activities has far outgrown the space capacity of the institution to care for it properly. On a single day as many as 2,500 boys and girls may be found in the museum preparing for their examinations. For this purpose adequate space must be provided. Still greater care is necessary for the large classes coming for a day from the outlying sections of the city or from neighboring cities in New York and New Jersey, which also are finding the museum in increasing numbers. To care properly for this enormous number of school children, a special school service building has been planned in the southwest court, to be devoted exclusively to their use.

On April 21, 1922, the Board of Estimate and Apportionment of the City of New York unanimously appropriated $570,000 for the construction and equipment of the School Service Building of the American Museum of Natural History. This action of the city authorities opens a new period in the history of the museum's relation to the schools and is significant appreciation of what the museum is doing in bringing nature to the boys and girls of the city. The work of the museum with the schools during the last eighteen years has been carried on with inadequate facilities. The Department of Public Education, which has immediate charge of these activities, has been housed, for the most part, in corridors, basements and anterooms in various parts of the present edifice. In fact, under the circumstances, it is surprising that the museum has attained the position of usefulness that it now holds in the educational system of the city.

The School Service Building is to be located in the southwest court of the museum. It will be a four-story and basement structure, connected by covered bridges in the first and second floors with the north wing on the east and the southwest wing on the west. The basement and the first floor will be 160 x 88 feet, and the second, third and fourth floors will be 160 x 53 feet. The height from the basement to the peak will be 91 feet and the cubical space approximately 1,000,000 feet. It is estimated that from 3,000 to 5,000 children may be properly taken care of daily in the School Service Building, or from ten to twenty times the number that the present facilities of the museum will permit.

How highly the educational service of the museum is estimated may be inferred from a reading of the following resolution adopted by the Board of Superintendents of the Board of Education of New York City on March 27 by way of endorsement of the application of the American Museum for funds for the School Service Building:

Whereas, The American Museum of Natural History since 1881 has been conducting educational work with teachers, and since 1904 has been supplying the public schools of the City of New York with lectures and with nature-study material of all kinds, with lantern slides and other visual education aids in teaching geography, history and natural science; and

Whereas, The American Museum, entirely at the expense of the trustees, through its explorations in all parts of the world, is bringing to New York rare and valuable educational specimens which are made freely available for the use of the teachers of the city; and

Whereas, The museum is lacking in adequate facilities for receiving the school children who visit the museum and for housing the administrative work connected with its operation with the public school system of the city, and has therefore made application to the Board of Estimate and Apportionment for the appropriation of $570,000 for the erection of a four-story School Service Building in the southwest court of the American Museum of Natural History.

Resolved, That the Board of Superintendents of the Board of Education of the City of New York desires to record its unreserved approval of the valuable service which the American Museum is rendering to the schools of the City of New York, and heartily indorses the plans of the trustees for making it more thorough and effective and hereby recommends to the Board of Education that it request favorable consideration from the Board of Estimate and Apportionment of the museum's application for funds to erect and equip the School Service Building.

While the practical side of the school work

of the museum is cared for by the city, the scientific side is entirely cared for from trustees' funds. It is interesting to record that during the past sixteen years the total amount contributed by the trustees, members and friends of the museum to the endowment and to the enrichment of the collections was $11,871,722. Although the present city government has been more liberal than any of its predecessors, providing for annual maintenance the generous sum of $352,025.52, the generosity of citizens of New York so far exceeds this provision by the taxpayers that it nearly doubles it. Thus, for every dollar contributed by the city from tax funds, the citizen receives $3.00. The growing appreciation of the museum by the public is shown by the attendance which has risen from 613,152 in 1910 to 1,174,397 in 1921. Sunday opening, which was one of the most warmly debated questions in the early history of the museum, leading to the resignation of some of our strict Sabbatarians, during the year 1921 totaled 327,888, showing that the museum is sought for wholesome and inspiring education during the Sunday afternoon hours by constantly increasing numbers. The Sunday attendance during January, 1922, alone has been 51,062.

Like all other educational and municipal institutions, the operating cost of the museum has doubled during the last decade. This increase, however, is not due to the increased number of employees or to extravagance, but to the necessary increase in salaries and material required for the proper upkeep. For the year 1921 the museum experienced a deficiency of $88,249.48, to meet which $56,000 was contributed from the accrued interest on the Margaret Olivia Sage Fund and $32,348.42 was contributed individually by the trustees. For the year 1922 the trustees have reluctantly cut down the work of the museum by the amount of $81,059.56, and have guaranteed to raise $40,000 through their personal contributions and the gifts of members and friends. Realizing that this deficiency can only forever be obviated by increasing the general endowment fund and that for the immediate future the sum of $2,000,000 should be raised, the trustees announced at a meeting of the executive committee of the board, held on May 20, 1922, that their efforts to raise $2,000,000 during the present year by public contributions to its permanent endowment fund were receiving united and generous support from public spirited citizens, who, after a thorough investigation of the educational activities of the museum, were convinced of the worthiness of the undertaking.

The initial subscription of $250,000 came from Mr. George F. Baker, who, in addition to his previous gifts, now contributes that sum to the capital fund of the museum, the income from which is to be at the disposal of the trustees. Closely following Mr. Baker's gift, Mr. John D. Rockefeller, Jr., wrote to President Osborn that he long had felt that the American Museum of Natural History was an important factor in the educational and scientific life of New York City, and that it gave him pleasure to contribute $1,000,000 toward the permanent endowment, the income of which was to be available for any of the current needs of the museum. Mr. Rockefeller stated that he realized the unwisdom of seeking to forecast the requirement of the distant future, and was fully conscious of the dangers attendant upon the establishment of any endowment fund in perpetuity and, therefore, it would be agreeable to him, if in the judgment of the trustees it was wise, to have the whole or any portion of the principal of this gift devoted to any of the corporate purposes of the museum. To the above sums is to be added the amount received from the Eno bequest by which, according to the settlement of the contested will, the museum receives $272,000, of which $200,000 is to be added to the endowment fund.

Through the generosity of friends and from museum funds, work in the field has been undertaken with renewed efforts. The third Asiatic expedition, under the leadership of Roy C. Andrews, has begun preliminary work in China and has already forwarded valuable zoological material. This expedition will be in the field for five years. Rollo H. Beck, working under the auspices of the Whitney fund, is securing thousands of specimens of bird, animal and plant life from the remote islands of the South Seas. In Australia, Dr. W. K. Gregory and Harry C. Raven established most cordial

working relations with the government authorities and as a result the small collections of fauna of that continent which we now possess will be greatly enriched. Captain Harold E. Anthony and George K. Cherrie, on an expedition to Ecuador, secured 4,000 specimens of birds and mammals. On this expedition the little-known country of the head hunting Jivaro Indians was penetrated, and valuable photographs secured. In Africa, Carl E. Akeley has been successful in obtaining a family of five gorillas. With the photographs and accessories which this well-known taxidermist, sculptor and hunter has secured, it will be possible to complete the finest group extant of these man-like apes. Entomological work has been carried on by Dr. F. E. Lutz in the Pine Barrens of New Jersey and Northeastern United States. Ethnological studies were made in Utah, New Mexico, California and Peru. By far the most important work in this field of science has been made possible through the funds provided by Mr. Archer M. Huntington for the completion of a restoration of the ruins at Aztec, New Mexico. Earl H. Morris, who has this work in charge, has forwarded highly important specimens found in these ruins and his observations will go far toward establishing the cultural area of the early inhabitants of our great southwest. Mr. Barnum Brown has sent important paleontological specimens from Egypt, Abyssinia and India, and Albert Thomson has continued, with success, work in the fossil fields of Nebraska. Through exchange and by gift, as a result of the Neolithic tour in Europe. Professor Henry Fairfield Osborn secured collections enriching our European archeology and established most agreeable working relations with eminent scientists of England, Norway, Sweden, Denmark, Belgium and France, to the end that new discoveries bearing on the antiquity of man in those countries will at once be forwarded to the American Museum.

At the beginning of the year the trustees recommended the grouping of the scientific work of the museum into four divisions in order to harmonize the work of the different departments, and in order to produce greater efficiency and economy for the future harmonious development of the exhibition halls of the museum. The following scheme of work is now in effect:

I. *Division of Mineralogy, Geology, Paleontology and Paleography:* Curator William Diller Matthew, F.R.S., in charge. Under leadership of Curator Matthew, Curators Whitlock, Hovey, Reed, Osborn, Granger and Brown will confer and cooperate in the development of their respective subjects and exhibition halls.

II. *Division of Zoology and Zoogeography:* Curator Frank Michler Chapman, N.A.S., in charge. This division will include mammals, birds, reptiles, amphibians, fishes, insects and marine and terrestrial invertebrates. Curators Andrews, Anthony, Gregory, Chapman, Murphy, Noble, Dean, Nichols, Gudger, Lutz and Miner will confer and cooperate in the development of their respective lines of exhibition and scientific work.

III. *Division of Anthropology:* Curator Clark Wissler, Ph.D., in charge. This division will be coordinate with the present Department of Anthropology but will include direction of the Galton Laboratory and progress of the Galton Society, also William K. Gregory as representative of comparative anatomy, J. Howard McGregor in human anatomy, Honorary Curator Osborn in geologic relations and prehistory of man.

IV. *Division of Education, Books, Publication and Printing:* Curator George H. Sherwood, M.A., in charge. This division will include the officers and chief of the Department of Public Education, of the library, of *Natural History*, of the printing and publication departments, and of public information.

Outstanding Publications: The publications of the American Museum of Natural History for the year have been the *Bulletins*, the *Memoirs*, the *Anthropological Papers*, the *Novitates*, *Natural History*, and the *Museum Journal*.

THE NECESSITY OF BALANCING DIETARIES WITH RESPECT TO VITAMINES

THE fairly recent discovery that small amounts of unknown substances are necessary constituents of a complete diet has opened up a large and evidently attractive field of research. The enthusiasm with which this work is being prosecuted and the novelty of many of the results obtained, have apparently led to the conviction in many quarters that vitamines are of great importance in practical

dietetics, and that human dietaries should be deliberately balanced with respect to these factors. It may be fairly questioned, however, whether this attitude is not premature. Investigators in this field should remember that their experiments are being performed upon animals chosen particularly because they are known to be readily susceptible to a deficiency of this or that vitamine. Pigeons are used for experimental investigation of the anti-neuritic vitamine, because they so readily succumb to a diet devoid of this factor, and because the symptoms induced are so characteristic of the dietary deficiency. Similarly with guinea pigs and monkeys and the anti-scorbutic vitamine, and with rats and the growth vitamines. It is of great significance that when other animals are used in these studies, the results obtained are often not clear cut. When guinea pigs, rabbits or monkeys are used in the study of vitamine A, or when rats are used in the study of vitamine C, inconstant or entirely negative results are observed.

It is of course permissible to use animals known to be highly sensitive to vitamine deficiencies in the study of the relative distribution of vitamines in food materials. Rats may be used, for example, in determining the relative concentration of vitamine A in cereal grains, tubers, green leaves, etc. From the results obtained it may be concluded that green leaves are much richer in the factor than are cereals, or, if the work is conducted on a quantitative basis, that certain green leaves are so many times richer than a certain cereal seed in the vitamine. This conclusion would evidently bear no relation to the species of animal used, but would have a general application to all animals. However, as is so often done, if it is concluded that oats or white corn or potatoes are *deficient* in vitamine A, the conclusion has no general applicability whatever. It should be rigidly restricted to the rat, which has been chosen because of its relatively great requirement for this vitamine. The statement that a food is *deficient* in a certain vitamine, defines a relation between the vitamine content of the food and the vitamine requirement of the experimental animal, and hence can not with any degree of certainty be applied to other animals.

In many of the original articles reporting the results of feeding experiments relative to the distribution of vitamines in food materials, this loose interpretation may be found. As a result certain foods are generally classed as being deficient in certain vitamines. We are told that the cereals and many of their milling products, white potatoes, white bread, meats, and animal fats are deficient in vitamine A, that white bread and milk are deficient in vitamine B, and that most dried and preserved foods are deficient in vitamine C, when the facts only warrant the statement that they are relatively poor in these vitamines. For all that is known to the contrary, the vitamine contents of these foods may be considerable in relation to human requirements, and hence in dietetics they can not be considered deficient in them in any strict sense of the word. To illustrate the point, meat seems to be distinctly deficient in vitamine C for the guinea pig, since very large amounts of meat or meat extract in the ration of guinea pigs will not adequately protect them against scurvy. On the other hand, for human beings, even the relatively low concentration of the vitamine in meats is still so considerable in relation to human requirements that a moderate consumption of fresh meats will prevent the outset of scurvy indefinitely. In human experience, therefore, fresh meats can not be considered deficient in vitamine C.

In the total lack of quantitative data on the vitamine requirements of humans, and in the very general absence of malnutrition or disease among people in this country which can with any degree of probability be diagnosed as involving vitamine deficiencies, it seems premature to formulate recommendations for the balancing of diets with respect to vitamines. The richness of milk and butter in vitamine A, for instance, has been made the basis for an extensive campaign in favor of substituting these products in the diet for foods not so rich in this factor. That this vitamine is ever a limiting factor in human dietaries is questionable, and any statement to that effect is not

based upon evidence, but upon uncertain analogy with laboratory animals. That human dietaries are so frequently deficient in the fat-soluble vitamine as to warrant general recommendations for an increased consumption of foods rich in this dietary factor, is a presumption still further removed from fact. The latter statement may also be made relative to any of the known vitamines.

In regard to vitamine A in particular, the fact is sometimes overlooked that this seems to be a peculiarly growth vitamine, its functions in the animal body probably being confined largely if not entirely to the period of active growth. Adult rats have been maintained in good health for over a year on rations devoid of this vitamine as judged by current standards. At the Illinois Agricultural Experiment Station, four sows have been maintained for nearly a year on a ration of white corn (Silver Mine) and tankage, and have successfully raised two litters of pigs each, though the ration, according to tests on rats, is nearly if not entirely devoid of vitamine A.

In a recent report on vitamines prepared by the Medical Research Committee of the (British) National Health Insurance Commission, the relation of vitamines to the public health is discussed somewhat fully, and the conclusions reached have been widely circulated in this country. The tenor of their conclusions is that "a deficiency in food, which when complete or extreme leads to actual disease, may, when only relative, be responsible for ill health of a vague but still important kind," and in particular that "a deficiency of an accessory factor (vitamine) may be of a much smaller order than that necessary to produce the typical syndrome of the disease usually associated with the deficiency, but may nevertheless be sufficient to induce a distinct failure of nutrition and health." No criticism can be made of such hypothetical statements as these, but when the argument is made to converge upon a definite proposition that "there is a very real danger that the improperly balanced dietaries consumed in many cases may lead to a partial deficiency of one or more of the necessary substances (vitamines), if not of other components as well," one may be pardoned for questioning the reality of any such danger. The reasons for transforming a possibility into a "very real danger" are not at all obvious. And yet such a transformation is tacitly involved in any general recommendation that vitamine foods should be substituted in the bill of fare for other food materials less rich in vitamines, or that vitamine preparations having little other food value should be regularly consumed.

In the issue of SCIENCE for October 28, McClendon argues for the use of tablets containing vitamines A, B, and C. His plea is based upon premises of doubtful soundness. He points out the low content in vitamines of wheat flour, cane sugar, and hydrogenated fats, but does not consider the possibility that other staple articles of food, available the year round, including dairy products, meats, potatoes, and canned and preserved vegetables and fruits, may entirely supplement the diet with respect to vitamines. Nor does he consider that the general consumption of fresh vegetable foods, rich in vitamines, during the spring and summer months may result in a considerable storage of vitamines in the body which may aid in tiding over a period of low vitamine intake. The statement made that "there are many families who do not, under the present system, receive sufficient vitamines in their food," has no claim to credence, since it does not seem to be based upon any evidence whatsoever. Nor is there any particular reason why it should be assigned any high degree of probability.

The attitude taken in this brief discussion of the practical bearing of the recently acquired fund of information relating to vitamines, is admittedly conservative, though only to the extent of insisting that the connection between general conclusions and recommendations on this matter and experimental or other evidence should be sufficiently tangible to constitute at least a fair deduction. At a time when popular periodicals are widely publishing irresponsible articles on vitamines, ignorantly or deliberately creating an entirely distorted popular conception of them, and when commercial concerns are widely advertising purely hypothetical ad-

vantages of vitamine preparations, it is particularly important that investigators in nutrition exert great care in the wording of statements as to the practical significance of vitamines in every day life. Otherwise they may become unwilling accomplices in the perpetration of a gigantic fraud upon the American public.

H. H. MITCHELL

COLLEGE OF AGRICULTURE,
UNIVERSITY OF ILLINOIS

ANSEL AUGUSTUS TYLER

THE sudden death of Professor Tyler of Millikin University (Decatur) on March 31 from pneumonia has taken from the institution and the college circle of the state a quiet and faithful worker whose place will be hard to fill.

Ansel Augustus Tyler was born at East Bridgewater, Pa., on March 7, 1869. He received his A.B. at Lafayette College in 1892, and won the Ph.D. at Columbia University in 1897. Thereafter he taught botany or biology for a year each at Union College, Syracuse and Arizona, with such success that in 1900 he was called to take charge of this work at Bellevue College in Omaha. At that date the prospects before Bellevue were alluring and he threw himself wholeheartedly into the work of building up not only his own department but also the college itself. The high appreciation in which his efforts were held was manifested by his election as dean of the college in 1911, a position which he held as long as he remained there. But the fortunes of Bellevue suffered serious reverses and, although Tyler devoted himself unsparingly to its service, he found the institution steadily losing ground through influences which he could not control or modify. So in 1916 he accepted a call to take charge of the department of biology at Millikin University. Here again he was formed to carry a heavy load of teaching during a transition period, but a year ago was granted some much needed aid in his department and had just started to realize his cherished ambition of developing that work when his career was so prematurely terminated.

Tyler's ability as a college student won him the Latin salutation on graduation and also election to Phi Beta Kappa. His later work brought him in 1898 membership in Sigma Xi. He was a fellow of the American Association and a working member of the State Academies in Nebraska and Illinois. In 1908 he was honored by election as president of the Nebraska Academy. Although quiet and retiring in personality, he was always ready to carry his part in enterprises of public merit. Thus in 1910 there was organized a movement to secure and preserve for Omaha a splendid and unique tract of wild forest near that city. Tyler served as secretary of this organization, the Fontanelle Forest Association, until he left Bellevue, and did much to develop public sentiment in favor of the project, which has recently realized much of its hopes through a generous gift from a public spirited citizen of Omaha.

But Dr. Tyler's greatest work was after all in his department. He inspired many college generations with his own high ideals of service and love of the truth. From his class room went out a steady stream of students filled with love of science and steadied by his calm and thoughtful leadership to test the offerings of life, to reject the hollow and false, and to cherish the true. Such service to the college and the state can not be measured in formal terms but will always be held in grateful remembrance by his students and his colleagues, as well as by the many other friends to whom he devoted himself equally unselfishly.

HENRY B. WARD

UNIVERSITY OF ILLINOIS

SCIENTIFIC EVENTS

RESEARCH WORK IN COAL MINING

THROUGH the efforts of the coal operators of western Pennsylvania, another year of extensive research work in coal mining will be conducted by the cooperative department of mining engineering of Carnegie Institute of Technology and the Pittsburgh Experimental Station of the United States Bureau of Mines. The research will be carried on through teaching and research fellowships appointed by the Carnegie Institute of Technology and supervised by senior investigators in the Experimental Station.

The establishment of four fellowships to do this work in 1922 and 1923 is an endorsement of similar investigations conducted this past year at these institutions. Four fellowships were established a year ago by the advisory board of coal operators of the cooperative department of mining engineering at the institute. They also chose the problems for the research work The Pittsburgh district is the first to take this progressive step in solving the problems of coal mining. When the results of the research work are broadcasted, the whole industry should be benefited.

The investigations of the four research fellows conducted the past year are completed and reports will soon be available to the coal industry. For the coming year, appointments have already been made by the cooperative department of coal mining to begin the work in September. The problems selected by the advisory board of operators have been assigned to the fellows in accordance with their specific training and adaptability. In making the appointments, applications were considered from all parts of the United States, reflecting the wide interest at large in research work of coal mining problems.

The four problems to be investigated, as recommended by the advisory board, are: (1) De-sulphurization of coke. (2) Corrosion problem with regard to acid mine waters. (3) Microscopic study of the Pittsburgh coal seam. (4) By-product study of the roof coal of the Pittsburgh coal seam.

The appointments and assignments for 1922-3 are:

Teaching Fellows: John H. Thompson, B.S. metallurgy, 1922, University of Washington, under Dr. Alfred R. Powell, physical chemist, of the United States Bureau of Mines, and V. F. Parry, B.S. mechanical engineering, 1922, University of Utah, under Joseph D. Davis, fuels chemist, U. S. Bureau of Mines.

Research Fellows: J. Richard Adams, B. S. physical chemistry, 1922, Cornell University, under R. J. Anderson, metallurgist, U. S. Bureau of Mines, and James U. Staud, B. S. geology, 1922, Pennsylvania State College, under Dr. Reinhardt Thiessen, research microscopist, U. S. Bureau of Mines.

THE OPTICAL SOCIETY OF AMERICA

THE seventh annual meeting of the Optical Society of America will be held at the National Bureau of Standards, Washington, Thursday, Friday and Saturday, October 26-28, 1922. The regular sessions for the reading of papers will be open to all interested persons.

Members and others desiring to communicate results of optical research are invited to submit titles of papers for the program to the secretary any time before September 25. Titles received after that date can not be included in the program. Address Irwin G. Priest, secretary, Optical Society of America, care of Bureau of Standards, Washington, D. C. Each title must be accompanied by an abstract of not more than 300 words. These abstracts will be printed in the program and in the minutes of the meeting. The purpose of the abstract is to give: (1) a more definite description of the *nature* and *scope* of the paper than can be conveyed in the title, (2) the essential results in so far as may be possible in the limited space allowed. It is hoped that the advance publication of these abstracts will prepare those attending the meeting to consider the papers more intelligently and with much greater interest. Authors are urged to cooperate in this effort by preparing their abstracts carefully with this end in view. They are also asked to submit with each abstract a careful estimate of the time which will be necessary and sufficient to present the paper briefly but adequately. In preparing the program the secretary will be guided by these estimates insofar as time will permit.

No title will be printed to be presented "by title." Titles should not be submitted unless the author has a bona fide intention to actually present the paper orally or have it presented by some one else.

One session will be devoted to vision and physiologic optics.

An exhibit of optical instruments and apparatus will be held at the Bureau of Standards in connection with this meeting. Communications relative to this exhibit should be addressed to Professor C. A. Skinner, chairman, exhibit committee, Optical Society of America, Bureau of Standards, Washington, D. C.

The program will be mailed to members about October 1. Others desiring programs in advance may obtain them by applying to the secretary.

IRWIN G. PRIEST,
Secretary

ADDITIONS TO THE SCIENTIFIC STAFF OF THE FIELD MUSEUM OF NATURAL HISTORY

THE following additions have been made to the scientific staff of Field Museum of Natural History:

Mr. Ralph Linton has been attached to the staff of the Department of Anthropology with the rank of assistant curator of North American Ethnology. Mr. Linton received his M.A. degree from the University of Pennsylvania and continued his anthropological studies at Columbia and Harvard Universities. He has carried on extensive investigations, principally archeological, in the eastern, central and southeastern United States, several reports of which have been published, as well as in Central America and Polynesia. Only recently he returned from an expedition to the Marquesas Islands for ethnological and archeological researches, undertaken under the auspices of the Bishop Museum of Honolulu, Hawaii, the results of which will be published shortly by that museum.

A new division of taxonomy has been created in the Department of Botany and Mr. J. Francis Macbride, now in Peru at the head of a botanical expedition for Field Museum, has been designated as assistant curator of taxonomy. Mr. Macbride is a graduate of the University of Wyoming of the class of 1914. Since graduation he has been connected with the Grey Herbarium of Harvard University.

In the Department of Zoology Dr. C. E. Hellmayr, known for his extensive work on neotropical birds, has been appointed associate curator of birds. Dr. Hellmayr was formerly connected with the Rothschild Museum at Tring, England, and more recently has been with the Museum of the University of Munich. He will arrive in this country early in September. Mr. Edmund Heller, former associate of Theodore Roosevelt, and Mr. John T. Zimmer have recently been appointed assistant curator of mammals and assistant curator of birds, respectively, and are now engaged in field work in central Peru, where they will remain until 1923. Mr. Karl P. Schmidt, formerly with the American Museum of Natural History, New York, has been appointed to the zoological staff as assistant curator of reptiles and batrachians.

HONORARY DEGREES AT THE UNIVERSITY OF PENNSYLVANIA

AMONG five honorary degrees awarded by the University of Pennsylvania at its recent commencement two were doctorates of science. In conferring the degree on Professor William Duane Dr. Penniman, the acting provost, said:

Graduate of Pennsylvania with the degree of bachelor of arts in 1892; afterward a student at Harvard and at Berlin; research worker in the Radium Institute of the University of Paris; professor of physics at Colorado, and since 1913 at Harvard; member of the National Academy of Sciences; John Scott medallist for scientific research; author of numerous important scientific papers, particularly on radium and related topics.

In conferring the degree of Professor George A. Piersol Dr. Penniman said:

Beloved by your colleagues and by your students. You have recently laid aside the active duties of the professorship of anatomy in our School of Medicine, from which in 1877 you were graduated, and in which for many years you have been one of the outstanding members of a distinguished medical faculty. Learned in your own field of research, lucid and eloquent as a teacher; the author of many papers and volumes on anatomy, histology and kindred subjects containing contributions to knowledge.

SCIENTIFIC NOTES AND NEWS

AT the annual meeting of the Pacific Division of the American Association for the Advancement of Science held in conjunction with the summer session of the American Association for the Advancement of Science, from June 22 to 24, the University of Utah conferred the honorary degree of doctor of laws on Dr. Barton Warren Evermann, president of the Pacific Division, and director of the Museum of the California Academy of Sciences and the new Steinhart Aquarium, now being construct-

ed in Golden Gate Park, San Francisco. On the same occasion the honorary degree of doctor of laws was conferred on Dr. James Harvey Robinson, director of the New School for Social Research of New York. It is understood that this degree had been conferred previously by the University of Utah on but six persons in the seventy-three years' history of the university.

THE degree of doctor of laws has been conferred by Lafayette College on Dr. Alfred Stengel, professor of medicine in the University of Pennsylvania.

AT the eighty-fifth annual commencement exercises of Marietta College, Dr. Charles E. Humiston, of Chicago, received the honorary degree of doctor of science in "recognition of his efforts to raise the standard of the medical profession in all parts of the country."

THE Harvard Chapter of Phi Beta Kappa has elected as honorary members Roland Burrage Dixon, professor of anthropology, and George Howard Parker, professor of zoology.

DR. WILLIAM B. OWEN, president of the Chicago Normal College, was elected president of the National Education Association at the meeting held last week in Boston.

THE Jenner medal of the Royal Society of Medicine was presented to Dr. J. C. McVail at the annual dinner of the society on July 6.

A PRESENTATION was made on June 6 by professional and other friends to Sir John Macpherson, M.D., in recognition of his long and eminent services devoted to the interests of the insane. He recently retired from the post of commissioner of the General Board of Control, and is about to proceed to Sydney as professor of psychiatry. The ceremony took place in the hall of the Royal College of Physicians of Edinburgh, with Professor Sir Robert Philip, president of the college, in the chair. Lord Polwarth made the presentation of a piece of plate and a check to Sir John Macpherson and a diamond brooch to Lady Macpherson.

DR. PEYTON ROUS, member in pathology and bacteriology of the Rockefeller Institute for Medical Research, has been appointed co-editor of the *Journal of Experimental Medicine*.

APPOINTMENTS effective July 1, 1922, at the New York State Agricultural Experiment Station, at Geneva, include the following: Dr. D. C. Carpenter, formerly assistant professor of physical chemistry at the University of Iowa, associate in research (chemistry) for investigations of milk proteins; Dr. W. H. Rankin, formerly officer-in-charge of the Laboratory of Plant Pathology of the Canadian Dominion Experimental Farms at St. Catharines, Ontario, associate in research (plant pathology) for investigations of raspberry diseases:; Dr. E. E. Clayton, formerly extension plant pathologist of Ohio State University, and Mr. Hugh C. Huckett, a graduate student at Cornell University, plant pathologist and entomologist, respectively, for the newly established laboratory for the study of insect pests and plant diseases affecting vegetable crops on Long Island; George L. Slate, assistant in research (horticulture); Walter F. Morton, assistant chemist.

DR. T. F. ASCHMAN, of Pittsburgh, Pa., chemist to the Pennsylvania Bureau of Foods, has been elected chairman of the Board of Chemists of the bureau, to succeed the late Dr. William Frear.

MR. S. M. KINTNER has been recently appointed manager of the research department of the Westinghouse Electric and Manufacturing Company to succeed Mr. C. E. Skinner, who is now assistant director of engineering.

MR. C. H. KIDWELL, formerly with the Semet-Solvay Company, Syracuse, N. Y., is now with Dr. Raymond F. Bacon, who has recently opened a consulting chemical engineering practice in New York City.

DR. AARON ARKIN, professor of pathology and bacteriology in the West Virginia University School of Medicine, has been granted a year's leave of absence for study and research abroad. He will spend the year in Vienna, Berlin, Paris and London doing work in pathology and medicine.

A BELGIAN scientific expedition, led by Professor Massart, of Brussels University, will

leave next month for Brazil, where biological, botanical and zoological research work will be carried out.

PROFESSOR A. E. WALLER, of the department of botany, Ohio State University, is spending four months in Europe continuing studies on economic botany.

AT the fifteenth annual meeting of the American and Canadian Section of the International Association of Medical Museums held recently in the Army Medical Museum, Washington, under the presidency of Professor James Ewing, of Cornell University, the following officers were elected for the ensuing year: *President,* Dr. Frank B. Mallory, Boston; *vice-presidents,* Drs. Howard T. Karsner, Cleveland, Harry Marshall, University, Va., and Robert A. Lambert, New Haven; *secretary-treasurer,* Dr. Maude E. Abbot, Montreal.

THE Harvard Medical Association held its triennial dinner on June 16. Dean Edsall spoke on the progress of the Medical School. Dr. Francis W. Peabody, professor of medicine, discussed his new work in the department of clinical investigation at the Boston City Hospital. Dr. Elliott P. Joslin spoke of the relations between the Medical School and its alumni.

THE Harvard Engineering Society held a dinner in Boston on June 14. Clifford M. Holland, '05, presided. The speakers included Dean Hughes, of the Engineering School, and W. W. Torrey, '19, secretary of the undergraduate section of the society. Howard E. Coffin spoke on "Our American air policies and national defence."

IN connection with the annual general meeting of the Eugenics Education Society a conference on "The inheritance of mental qualities, good and bad," was held at Burlington House, London, on July 4. Among the speakers were Dr. Tredgold, Dr. C. H. Bond, Dr. Bernard Hollander and Mr. R. A. Fisher.

PROFESSOR JAMES G. NEEDHAM, of Cornell University, will give a special lecture at the University of Utah Summer School, on "War, a biological phenomenon."

AN address was delivered on June 7 before the Medico-Chirurgical Society of Edinburgh, with Professor Sir Robert Philip in the chair, by Professor A. Calmette, of the Institut Pasteur of Paris, on "The protection of mankind against tuberculosis."

A COMMITTEE has been formed in France to erect by international subscription a monument in memory of Ives Delage, distinguished for his work in biology. It is proposed to place the monument at Roscoff, where Delage was in charge of the Marine Biological Station.

FRED C. WORKENTHIN, assistant professor of botany at Iowa State College, Ames, Iowa, died on June 13, at the age of thirty-two.

EDWARD HALL NICHOLS, clinical professor of surgery in the Medical School of Harvard University, has died at the age of fifty-eight years. Dr. Nichols was also director of the cancer laboratory of the Croft Research Fund, Boston.

WILLIAM MUNROE COURTIS died at his home in Detroit on June 19, aged eighty years. He was a well known consulting engineer in mining and had also made contributions to botany.

PROFESSOR FREDERIC PERCIVAL TUTHILL, chemist, for twenty years connected with the Brooklyn College of Pharmacy, died on July 2, aged fifty-four years.

BY the will of the late Prince Albert de Monaco, a million francs is bequeathed to the Paris Academy of Sciences.

A RESEARCH fellowship of $1,000 for the study of the chemistry of tubercle bacillus has been given to Yale University by the National Tuberculosis Association. The funds will be used to support research in the subject now being conducted by Professor Treat B. Johnson and his associate, Dr. E. B. Brown.

THE National Poultry Council of Great Britain has been informed by the ministry of agriculture that the revised scheme of operation for the educational and research work of a national poultry institute has now been approved by the development commissioners, and that the treasury will sanction the payment of the promised grant. The amount of the grant for capital expenditure is not to exceed £19,500, and is conditional on a further sum of £6,500 being provided by the industry, to complete the £26,000 which, it is estimated, will be required

under this head. As the scheme is to be financed out of the fund provided under the Corn Production Acts, it is understood that the maintenance grant (estimated at £6,000 per annum) is limited to a term of five years, at the end of which time it will be subject to reconsideration by the treasury. The starting of this work depends now on the promptitude with which the contribution from the industry is raised.

A COMMITTEE of representatives of British governmental departments and British scientific men has recently recommended a comprehensive scheme of dealing with inventions by government workers or by individuals aided or maintained from public funds. The committee recommends the organization of an interdepartmental patents board. Pending a decision in each case by this board, all rights in inventions made by government employees shall belong to the government. If the inventor can satisfy the board that he derived no assistance from the nature of his employment in making the invention, he shall be entitled to all rights therein. The question of whether the inventor is entitled to any reward in addition to the enjoyment of commercial rights shall be decided by the board. Where the rights in an invention capable of commercial exploitation belong to the government, the invention shall be exploited commercially for the benefit of the government. A system of awards and merits for the inventor is proposed, which should be passed upon by an awards committee, to be organized within the proposed patents board. These are not intended as substitutes for commercial profits, but as a recognition of merit and as an incentive to government workers.

A PSYCHOLOGICAL test in addition to the regular examination will be required of all men entering Princeton University. A trial period of two years has been set for the test. During this time any man entering who fails to pass the test, but whose written examinations are satisfactory, will not be disqualified. If the faculty committee which has charge of the test reports favorably at the end of the trial period, the psychological test will be as essential thereafter as a written examination.

ENGLISH literature leads in popularity as a subject for "concentration" among Harvard freshmen. Of the 634 freshmen who have filed with the committee on electives their choice of subjects for concentration during the rest of their college course, 175 have selected English. Economics comes second, with 119; history is third, with 66; Romance languages fourth, with 59, and chemistry fifth, with 46. The other subjects chosen and the number of freshmen who are to concentrate in each are as follows: Mathematics, 32; government, 26; history and literature, 25; biology, 24; physics, 14; classics, 13; fine arts, 11; geology, 6; psychology, 6; philosophy, 4; social ethics, 4; all others, 4.

As reported in *Nature*, an important contribution to the controversy over the Piltdown Skull has been made by Professors Elliot Smith and Hunter at a meeting of the Anatomical Society, when they exhibited a reconstruction of the skull and its endocranial cast. The reconstruction has been made by a careful and minute examination and correlation of the anatomical points of the fragments of the skull. The result confirms generally the reconstructions made by Dr. Smith Woodward and Mr. Pycraft when first the skull was discovered, and agrees in showing the remarkable breadth of the skull and its low capacity, which is, in each case, placed below 1,300 cc. This later reconstruction, however, differs in one important particular. The occipital fragment assumes a more vertical position, with the effect that the skull is brought into closer relation with the skull of the anthropoids. As a result, the cranium falls into complete harmony with the chimpanzee-like jaw, and the paradox which has hitherto been a stumbling-block to the acceptance of the jaw as indubitably belonging to the fragments of the cranium now disappears.

THE Association of Engineers whose members are former students of the Liége University, on the occasion of the seventy-fifth anniversary of its foundation, held in Liége, from June 11 to 16, an international scientific congress. There were seven sections, dealing, respectively, with mining, metallurgy, mechanics, electricity, chemical industries, civil engineering and geology, in each of which a number of papers were read and discussed.

UNIVERSITY AND EDUCATIONAL NOTES

BY the will of Mrs. Ann M. Swift the University of Chicago and Northwestern University received a total of $200,000, while the American University of Washington receives $25,000.

THE *Journal* of the American Medical Association states that the sum of $2,500,000 has been appropriated by the Dominican Order which controls the University of St. Thomas College of Medicine, Manila, for the erection of a new concrete building, in which will be housed all the colleges of the university, the laboratories, the dispensary, the libraries, the hall, the chapel and its offices, leaving the old building which the university now occupies in the Walled City. The site for this new building will be on the outskirts of Manila. Construction work will be started in a few months. A university hospital for the practice of the students of the college of medicine will be erected on the same site. Dr. José Luis de Castro is dean of the university.

DR. A. A. HAMERSCHLAG, who has been president of Carnegie Institute of Technology, Pittsburgh, since it was established in 1903, has resigned, effective on July 1. Dr. Thomas Stockham Baker, secretary for the past three years, and formerly director of the Jacob Tome Institute at Port Deposit, Md., has been appointed acting president. Dr. Hamerschlag plans to enter business, with offices in Pittsburgh and New York, as adviser and consultant to business organizations.

DR. GEORGE W. CORNER, associate professor of anatomy at the Johns Hopkins Medical School, has been appointed head of the department of anatomy in the new school of medicine and dentistry now being organized at the University of Rochester, N. Y.

THE appointment is announced of Dr. Edwin Bramwell to the Moncrieff-Arnott chair of clinical medicine at the University of Edinburgh, in succession to the late Professor Francis D. Boyd. Dr. Edwin Bramwell is a son of Dr. Byron Bramwell, the distinguished Edinburgh physician, and has made his reputation chiefly in the study of diseases of the nervous system.

AT the University of Cambridge Mr. F. C. Bartlett, St. John's College, has been appointed reader in experimental psychology and director of the Psychological Laboratory.

DISCUSSION AND CORRESPONDENCE

SOME SIMPLIFICATIONS OF MICROSCOPICAL TECHNIQUE

IN handling large classes in histology and allied biological subjects in which it is desirable to supplement loan series of slides by sections, given out for individual mounting, any means of shortening or economizing the work of preparation is usually welcome. During the past three or four years I have hit upon and practically tested out a number of such short cuts which have proven exceedingly valuable. Others have doubtless used the same or similar methods, but their worth may justify publication here.

Among these are first, the substitution of C. P. Acetone for the usual series of graded percentages of alcohols for the hydration and dehydration of sections when staining and mounting. Each student is provided with three slide bottles, labelled Nos. 1, 2, and 3, and containing C. P. Acetone in two and Absolute Acetone in the third. Through this series the mounted sections are passed to and from the stain, before clearing and mounting as usual. Acetone mixes readily with water and with alcohol, and the absolute acetone with xylene or other clearing agents. It is especially valuable in applying the various blood stains to sections, since it does not extract them, nor affect them in any appreciable manner. It may also be substituted for absolute alcohol as a solvent for celloidin when imbedding in the latter medium. Its high volatility and inflammable nature are dangers against which the student should be explicitly warned.

The second method is the staining of ribbons of sections without removing the paraffine in which the material was imbedded. The paraffine ribbons are cut into convenient lengths, floated upon warm distilled water in a suitable dish until flattened, cooled, and then transferred to the surface of the filtered stain in a flat dish, upon which they are left floating until stained. The correct time of staining can be readily determined by experiment.

From the stain they are transferred by means of a clean lifter or a glass slide to a dish of distilled water, rinsed, differentiated if necessary, suitably counterstained in the same manner, rinsed, and finally floated into place upon the surface of an albumenized slide, dried thoroughly, cleared and mounted.

The majority of our routine histological stains may be used in this way, but few, such as iron haematoxylin, presenting any difficulties. By this method a number of sections of the same tissue or organ may be stained by different methods to bring out special structural features, and then mounted side by side on the same slide for comparative study. For example, Haematoxylin and Eosin, Mallory's or Van Gieson's connective tissue stains, and Para-Carmine combined with Orcein or Weigert's Resorcin-Fuchsin may be used, and a section of each mounted together under the same cover glass. Even the most reluctant student may thus be brought to a comparative synthetic study of the structure of an organ.

In routine work large numbers of sections may be stained by an assistant in a short time, floated upon distilled water in large dishes, and issued to a class, ready for mounting, without the large expenditure of time, labor, reagents and glassware necessitated by the usual method of handling individually mounted sections. If preferred the sections may be issued directly to the students, and each can readily perform the staining for himself, using Syracuse watch glasses or similar dishes. The main points are that the removal of the paraffine from the section, and the consequent use of albumen or other fixative, xylene, absolute alcohol, and the customary series of three to five percentages of graded alcohols are all unnecessary, save in the case of serial sections of considerable extent, and in delicate cytological work. Finally it is not even necessary to remove the paraffine as a final step before mounting in balsam, if the section has been thoroughly dried, the surrounding paraffine in such a mount being entirely invisible, save with a very narrow diaphragm opening.

F. M. MCFARLAND

DEPARTMENT OF ANATOMY,
STANFORD UNIVERSITY, CALIFORNIA

PROFESSOR KEYSER ON RUSSELL'S "THE ANALYSIS OF MIND"

May a belated reader of Professor Keyser's notice, in SCIENCE, November 25, of Bertrand Russell's *Analysis of Mind* dissent from the implication that the book is written by a man specifically competent to deal with psychology? My dissent is not based on the obviously amateur quality of Russell's psychology, for an amateur may be a good observer and many of Russell's psychological passages have genuine significance. Nor do I care to stress the rather eclectic range of Russell's psychological reading. I am concerned rather with his totally non-psychological point of view. In this book, as in all his others, Mr. Russell obviously treats psychology as handmaid of metaphysics —a procedure quite as disastrous to scientific psychology when the metaphysics in question is neo-realism as when it is, say, Wolffian spiritualism. Russell himself declares that he is "interested in psychology not so much for its own sake as for the light that it may throw on the problem of knowledge";[1] and the fact which his reviewer correctly states, that the motive of the book is "primarily logical . . . that of reconciling two tendencies seemingly" inconsistent, "the tendency of the behaviorist to materialize mind and the tendency of modern physicists to spiritualize matter"—this fact alone rouses the suspicion of every scientifically-minded reader. For the competent psychologist writes not in the interest of logical or metaphysical reconciliations but rather with the primary intent to record and to order observed phenomena. The reviewer provides us with many other instances of the author's metaphysical manipulations. Russell's doctrine of desire, for example, as "a mere 'fiction' like force in dynamics," may be (in Keyser's phrase) "a diabolically ingenious analysis" but certainly is not a psychological conception. And assuredly Russell's agreement with the realists in the thesis that (with respect to sensations) the world is composed of a "neutral stuff" would not by anybody be regarded as a contribution to psychology.

I am not here concerned to criticize the argument, or the more plentiful assertions, on which the metaphysical conclusion of *The*

[1] *Analysis of Mind*, p. 15.

Analysis of Mind is grounded. Yet I can not forbear to call the interested reader's attention to the mortal wound which Russell himself inflicts upon his argument by his treatment, in Lecture XII, of belief. He has rested the whole realistic theory of consciousness as "neutral stuff" on the denial of the "personal" or "function" conception of consciousness.[2] Yet here he insists that "believing," a present occurrence "in the believer" is "an actual experienced feeling,"[3] a personal "attitude."[4] Professor Keyser, to be sure, might regard this as one of those "notably frequent public recantations of experience" which testify to Russell's "ceaseless re-examination of seeming certitudes and . . . to an unsurpassed intellectual candor." But I can not force myself to such a pitch of liberality. I am willing to grant Russell the privilege of changing opinion with every volume, of arguing in 1921 for the neutral monism which in 1914-1915 he so brilliantly refuted.[5] But liberality may be carried too far, and for my part I protest that nobody, be he Bertrand Russell himself, shall be at liberty in the course of a given argument to recant, publicly or privately, one of the premises of the argument itself.

MARY WHITON CALKINS
WELLESLEY COLLEGE

METHODS OF GERMAN PUBLISHERS

IN Germany the chief publishers of mathematical books and periodicals are Springer, Teubner, and Vereinigung wissenschaftlicher Verleger (a combination of the firms: Göschen, Guttentag, Reimer, Trübner and Veit). They have decided that for their mathematical publications of 1922 America shall, in general, be required to pay at least as much as $2.40 per 100 marks of the price for Germany.

Of *Jahrbuch über die Fortschritte der Mathematik*, volume 45, part 3 (conclusion) has not been published; but part 1 (1920, 12 + 368 pages) and part 2 (1921, 6 + 526 pages) are sold in Germany for 73 and 190 marks respectively. The corresponding prices for America are $4.65 and $9.00! Such extortion ought appreciably to hasten the appearance of an American abstract journal, the establishment of which has been already approved by the National Research Council.

But again, *Journal für die reine und angewandte Mathematik* (Crelle), volume 151 (1920-21), is sold in Germany for 96 marks; the price to America is $6.00!

The publisher of these two periodicals is Vereinigung wissenschaftlicher Verleger.

The above facts, obtained from the publishers themselves on May 26 and May 31, 1922, will probably suggest to mathematicians the immediate cancellation of all contemplated orders for the publications of Vereinigung wissenschaftlicher Verleger—at least.

R. C. ARCHIBALD
NEWCASTLE-UPON-TYNE,
JUNE 12, 1922

RUSSIAN SCIENTIFIC LITERATURE

THE officers of the Russian Entomo-Phytopathological Congress sent a request some months ago to American scientific societies and investigators to send to Russia literature on entomological and phytopathological matters.

In connection with this request the Russians promised to send Russian scientific literature in exchange. Certain difficulties, however, have been found to exist, principal among which is a regulation by the Soviet government made about two months ago which prohibits the sending out of literature from Russia without a special permit. This permit seems very difficult to get. The Russian scientific men, therefore, who have received American scientific literature in response to their request, feel much embarrassed by their inability to respond by sending Russian literature here, and I have promised to make known, in this way, the facts which have prevented their promised sending of Russian literature to those Americans who have kindly sent scientific papers to them.

VERNON KELLOGG

QUOTATIONS

PHYSIOLOGICAL EFFECTS AT HIGH ALTITUDES

IN the Friday evening discourse delivered at the Royal Institution last week Mr. Joseph

[2] *Op. cit.*, pp. 17 ff.
[3] *Op. cit.*, pp. 233 ff.
[4] *Op. cit.*, p. 243.
[5] Cf. *The Monist*, XXIV, XXV, *passim*.

Barcroft, F.R.S., reader in physiology at the University of Cambridge, provided some details of the recent expedition to Peru, to study physiological effects at high altitudes, supplementing the account he gave to the Chelsea Clinical Society as reported in our columns on April 22 (p. 648). The observations were carried out in the mining town of Cerro de Pasco, which is situated in the Andes, at a height of about 14,000 feet. Mr. Barcroft noted in passing the curious fact that at 12,000 feet there were cows which gave milk, and at 13,000 feet cows which gave little or no milk; this was not a question of fodder, because fodder was brought to the animals, and still they gave no milk. At 15,000 feet there were neither cows nor milk. Another point of interest was that fleas disappeared at 11,000 feet, though the louse accompanied man to a higher region. The Andes were chosen for this expedition for two reasons. The less important was that, unlike the heights on Teneriffe, to which the lecturer had previously gone as a member of an expedition, water was obtainable, by means of a water tower on the railway, right up to the level at which the work was done, and water, of course, was the first essential of the laboratory. The second reason was that in this case, instead of a mountain solitude, there was a community which had been acclimatized for generations to life at these levels. The people in this region were interesting ethnologically: they might loosely be called Indians, and their civilization, such as it was, probably dated back to before the days of the Incas. Many of them lived in chimneyless and windowless houses; they had a purely communal system of government, and some of their customs would hardly appeal to more civilized races. When a native was very ill, for instance, the date of his funeral was fixed without reference to his convenience, and an official saw to it that he was ready to keep the appointment! It was remarkable what loads the people were able to carry at these altitudes. A boy of about 13 would carry from the interior of a mine a burden of 40 pounds, ascending a staircase with it from a point 250 feet below, while a full-grown man would carry a hundred pounds of metal! yet the European was out of breath if he carried his coat up a slight incline. Even the native, however, only accomplishes the work with great panting and with many intervals for rest. X-ray photographs of the chests of some of the natives showed that the ribs started almost horizontally and went round the chest like the hoops of a barrel. According to tables of chest measurements in relation to the length of the spine, the natives in this region should have a chest measurement of less than 80 cm, whereas their usual chest measurement was 90 cm. The native who was 5 feet 2 inches in height had a chest which should belong to a man of 5 feet 11 inches. Mr. Barcroft dealt also with blood changes. The immediate effect of the ascent was greatly to increase the number of red blood corpuscles, and although this excess was somewhat reduced later, the blood of members of the expedition showed throughout a larger proportion of young blood cells than normal. Comparative X-ray photographs showed also that the heart tended distinctly to become smaller. Mr. Barcroft closed by appealing for the establishment of some institute and laboratory which should continue permanently the study of the physiological effects at high altitudes.—*British Medical Journal.*

SCIENTIFIC BOOKS

BOOKS ON NATURAL AND UNNATURAL HISTORY

How and Why Stories: JOHN C. BRANNER. Henry Holt & Co., New York.

Interesting Neighbors: OLIVER P. JENKINS. P. Blakiston's Son & Co., Philadelphia.

The Earth and Its Life: A. WADDINGHAM SEERS. World Book Company, Yonkers-on-Hudson, New York.

I find on my desk three little books of natural and unnatural history, as different as possible, one from another, but each wholly admirable of its kind. Branner's *How and Why Stories* represent the efforts of wise old negroes on his father's plantation in East Tennessee to account for the ways of common animals as seen against a Biblical background. The various tales are as racy and quite as remarkable as the Georgia adventures of Brer Rabbit as related by Joel Chandler Harris. In them,

much as in *Paradise Lost,* Ole Nick takes the part of hero though he stands in the foreground only when mischief is to be accomplished as when he paints some of the Good Lawd's sheep and men black while the Creator was busy in the dining room after a hard day's work. So "dey come out culled all 'cep'n de pams o' dey han's an' the bottoms o' dey feet, an' de bran' new sun done make dey hair kinky 'cause it was so hot. But after all, honey, dey's all white on de insides, des lak othah folks, an' dey chilln dey's all des de same way."

The reason "why the snake has no feet" will interest students of evolution. It appears that Ole Nick was snooping around the wall outside the Garden of Eden, finally boring a hole through, thereby wearing "about an inch off de end of his ole tail." Through this hole he coaxed the snake, then a lizard, to thrust his nose, which Ole Nick seized "an' he pull so ha'd dat he scraped all fo' o' de snake's laigs clean off, an' he pull an' stretch his body out so long dat when he was all thu' de hole he look jes' like a piece of rope."

The moral attached to each tale is unique. In this case "dey don't no good come o' listening to de debble. He's allus ready to promise you mo'n he can do, and to tell you things he don't know nothing about."

As to the origin of this species of folk-lore, Dr. Branner says that it can not be traced to Africa. "It is too clearly under the influence of Biblical history to have had such an origin."

In a few trenchant words, Dr. Branner disposes of the idea that negroes were happier in slavery. It is true that on emancipation "they were inveigled away from their former homes and friends and finally left to the winds and waves of fate like so much flotsam and jetsam of the war." Returning at one time to his old home at Dandridge, he called on a beloved and trusted former slave, "Aunt Ellen." He found her "in a state of poverty and wretchedness that went to his heart." After discussing her condition, he asked her: "Don't you think you were better off as a slave?"

And this is what Aunt Ellen replied:

"De Lawd bless yo' soul, chile, dat's a fac'; hit's jes lak you ben a sayin'. I knows I had mo' to eat an' mo' to wear, an' a better house to live in, an' all o' dem things, an' you all was mighty good to me; an' I didn' have none o' dese here doctah's bills to pay. But Law', honey, atter all, dah's de feelin's!"

"From that day to this I have had no more to say in favor of human slavery."

The book is admirably illustrated, the serious pictures by William S. Atkinson, the zoological artist of Stanford, and the cartoons—not less excellent—by Richard K. Culver, both former students of Dr. Branner.

In *Interesting Neighbors* Professor Jenkins has given a model of what "Nature Studies" for children should be. Taking familiar animals, mostly insects, and various wild flowers, he leads the reader along to the observation and interpretation of phenomena that ought to be familiar. Anywhere and everywhere he finds unexpected adaptations and relations of cause and effect, for every fact in Nature has somewhere a cause behind it.

The "Magic House" is the oak-gall, which sacrifices a leaf to make a safe home for the babies of the gall-fly, thus secure from depredations of the flycatcher, the tree frog and predatory insects. Many other insects are treated in similar fashion, their life histories accurately described and in such fashion that children of any age will be interested, and those not case-hardened will be eager to verify. And to induce them to do this is the purpose of this charming book, which will not suffer in comparison with the works of Fabre. Atkinson's illustrations are admirable.

The Earth and Its Life is a compact record of the story of Evolution from the lowest Protozoan up to civilized man. It is written in simple and interesting fashion and so far as the limits of space permit, the conclusions are fairly represented. Little effort is made, however, to define the factors in organic evolution, the processes in operation day by day, the knowledge of which gave reality to what before Lyell and Darwin was merely a philosophical conception. The last seven of the eighteen chapters are devoted to the evolution of man, a matter of increasing scientific interest as the caves and gravels of the earth are becoming more and more fully explored.

DAVID STARR JORDAN

Philippine Birds for Boys and Girls: RICHARD C. MCGREGOR and ELIZABETH MARSHALL, Bureau of Printing, Manila.

Just as I finished the last line above, there came to my desk another charming book of nature study written for the children of the Philippines.

Mr. McGregor (by the way, a former student of Jenkins, Branner and myself) has been for years the ornithologist of the Bureau of Science in the islands and is author of a valuable "Manual of Philippine Birds." In this small book he gives simple, intelligible life histories, mostly accompanied by colored plates, of thirty of the most striking birds of the region. Among the most notable is the edible-nest swift (*Collocealia germani*) with its singular habit of locking the female in its nest of glue during incubation. When one nest is taken for "bird's nest soup," it cheerfully builds another, but, when in a hurry, it mixes sticks and moss with the glue. Most powerful of the birds of the islands is the monkey-eating eagle (*Pithecophaga jefferyi*), the chief enemy of the monkeys of the Philippine forests. "Handsome and cruel, it is large and strong and fearless. No other country in all the world has a monkey-eating eagle. It is our eagle. His picture would make a good symbol for a flag or a school banner. It would stand for strength, industry, courage."

For such a purpose it might serve even better than our own bald eagle, "the piratical parasite on the osprey, otherwise known as the emblem of the republic" (Elliott Coues).

DAVID STARR JORDAN

SPECIAL ARTICLES

THE CONTROL AND CURE OF PARATHYROID TETANY IN NORMAL AND PREGNANT ANIMALS

Normal Animals.—In our first communication on this subject[1] we stated that we could keep completely parathyroidectomized "dogs alive indefinitely (at least two months) even when fed daily on a diet consisting chiefly of meat" by means of the intravenous injection of Ringer's solution. We have confirmed and extended this work as follows:

1. If this treatment is maintained for about forty days no further injections are necessary, especially if

2. The animals are given only a moderate amount of meat and care is taken that

3. The animals do not become constipated.

After *about* forty days the animals can be put on their usual diet containing great quantities of meat without inducing tetany. In one animal we could induce the severest form of tetany on the one hundred and twenty-first day (February 22, 1922) after parathyroidectomy by feeding an excessively large amount of meat mixed with barium sulphate as a constipating agent. In fact, if this animal became constipated spontaneously on its usual meat diet more or less severe parathyroid tetany attacks would occur.

The freedom from all signs of tetany on a normal meat diet after treating parathyroidectomized animals for about forty days might be due

a. To the hypertrophy under treatment of accessory parathyroid tissue;

b. To the compensatory activity of some other organ or organs;

c. To the increased tolerance of the poison or toxins responsible for the tetany.

d. To the return to functional activity of a deranged gasterointestinal tract as part of a general paresis of the sympathetic nervous system. We have some evidence on the latter possibility.

At any rate, it is clear that the cause of the tetany is an exogenous poison or poisons derived chiefly if not entirely from the proteins (more especially the meat) of the food.

Pregnant Animals.—Parathyroid tetany is notoriously severe and fatal in pregnant animals. Eight of Carlson's[2] fifteen dogs died in "acute tetany within twelve to twenty-four hours after parathyroidectomy." The average duration of life of ten pregnant animals operated on by Werelius[3] was 1.98 days.

We used to date three pregnant animals: One early after conception; two just before

[1] Luckhardt and Rosenbloom: *Proc. Soc. Exp. Biol. and Med.*, Vol. XIX, No. 3, 1921, p. 129.

[2] Carlson: *Proc. Soc. Exp. Biol. and Med.*, 1913, Vol. X, pp. 183-184.

[3] Werelius: *Surg., Gynec. and Obstetrics*, February, 1913, pp. 141-144.

term. The first of the series died on the fourteenth day after parathyroidectomy probably from a hemothorax. Three hundred and seventy-five cc of almost pure blood were found in the thoracic cavity of this animal at autopsy.

Of the remaining two pregnant animals one went into labor four days after parathyroidectomy and gave birth to seven young. This animal showed slight tetany symptoms twenty-four hours after operation and again violent tetany at the time of labor. Three days later the consumption of an unusually large meal of meat precipitated a tetanic convulsion involving the diaphragm. Artificial respiration had to be given. The tetany was soon controlled by enemata and intravenous injections of Ringer's solution. The animal was kept throughout the puerperium on a moderate meat and bone diet. Artificial feeding of the young was resorted to in part. The latter contracted distemper, the last two dying from the disease on the twenty-sixth and twenty-eighth days after birth. The mother is alive at the time of writing (ninety-eighth day after parathyroidectomy). She has received no injections since the fifty-first day.

The other pregnant animal went into labor on the day of the parathyroidectomy and within twenty-four hours gave birth to nine young. Her tetany attacks were unusually severe and difficult to control. Several of her young died. Others were given away. *Unaided she raised four of her young to the stage of weaning.* The last intravenous injection was given on the fifty-second day after parathyroidectomy. She is alive at the time of writing and in splendid physical condition (eighty-seven days after operation).

Our chief conclusions are as follows:

1. By means of the intravenous injection of Ringer's solution completely parathyroidectomized animals can not only be kept alive for a prolonged period of time but if this treatment is maintained for *about* forty days they are to all purposes cured of their tetany.

2. On the basis of further work we find that normal Ringer's solution is better than Ca free Ringer's solution in controlling parathyroid tetany.

3. The source of the poison responsible for the tetany is of exogenous origin (particularly meat of the diet). One can precipitate an almost fatal attack of tetany thirty-three days after parathyroidectomy in two hours by feeding an animal one half pound of meat, especially if the latter is not fresh.

4. In addition to the intravenous injections of Ringer's solution it is important to avoid constipation by feeding bones and giving soap suds enemata.

5. Even pregnant dogs can be kept alive. Instead of dying in tetany within seventy-two hours after parathyroidectomy they can pass through pregnancy, labor, and raise their young. The control and cure of pregnant and lactating bitches is, however, much more difficult than in normal, non-pregnant animals.

6. None of the adult animals which have survived as long as seven months have shown any signs indicative of myxedema although both lobes of the thyroid gland were removed at the time of the parathyroidectomy. They are in excellent physical condition. The administration by mouth of dessicated thyroid gland in three gram doses every other day for more than one month did not have the slightest effect on their general condition and behavior.

7. The young animals born of and raised by parathyroidectomized mothers never showed any symptoms even suggestive of tetany.

ARNO B. LUCKHARDT
PHILIP J. ROSENBLOOM
HULL PHYSIOLOGICAL LABORATORY,
THE UNIVERSITY OF CHICAGO

INFLUENCE OF H-ION ON GROWTH OF AZOTOBACTER[1]

WHILE studying the influence of the reaction of the soil solution upon the Azotobacter flora of soils,[2] it seemed desirable to ascertain the influence of the reaction of culture media upon pure cultures of these organisms. Several strains of Azotobacter were isolated from different soils and grown in dextrose media of different hydrogen-ion concentrations. The maximum hydrogen-ion concentration permitting growth was found to be p_H 5.9-6.0 for all

[1] Contribution No. 49, Department of Bacteriology, Kansas Agricultural Experiment Station.

[2] P. L. Gainey: SCIENCE, N. S. Vol. 48, pp. 139-140.

strains studied. This is appreciably lower than that reported (p_H 6.6-6.8) for two strains by Fred,[3] but agrees very closely with the senior writer's findings regarding the maximum hydrogen-ion concentration tolerated by these organisms in soils (p_H 5.9-6.0).[4]

As the hydrogen-ion concentration of the medium decreased, growth increased until p_H 6.1 to 6.4 was reached. Here growth appeared to be quite as vigorous as at lower concentrations.

No fixation of nitrogen took place in a hydrogen-ion concentration greater than p_H 5.9, while fixation in concentrations of p_H 6.3 to 6.5 was as great as in lower concentrations. The optimum reaction for the fixation of nitrogen appeared to be very closely associated with the optimum reaction for growth.

The total quantity of acid produced by the various cultures was insignificant. The culture medium employed required only about 0.05 cc N/1 acid per 100 cc to produce a change of 0.1 p_H in reaction. Even with this low buffer index only slight changes in the hydrogen-ion concentration of the medium were produced by the growth of any strain of the organism. This would indicate the production of inappreciable quantities of either acid or basic metabolic by-products by these organisms.

P. L. GAINEY
H. W. BATCHELOR
KANSAS AGRICULTURAL EXPERIMENT STATION

PRELIMINARY NOTES ON VAUXITE AND PARAVAUXITE

AMONG the mineral specimens collected on the Vaux-Academy Andean expedition of 1921 are two that have proved to be new. As the crystallographic work on these will take some time, the following brief notes are therefore presented:

VAUXITE

Color: Sky-blue to Venetian-blue (Ridgway); streak white. Luster vitreous. Transparent. Form: Aggregates of small crystals tabular parallel to b (010). Hardness 3.5. Specific gravity = 2.45.

Composition: 4 FeO. 2 Al_2O_3. 3 P_2O_5. 24 H_2O + 3 H_2O.

Crystal system: Triclinic.

Optical properties: Optically +; $\alpha = 1.551$; $\beta = 1.555$; $\gamma = 1.562$; all $\pm$ .003; $\gamma - \alpha =$ .001; 2V = 32°; Bx_{ac} emerges on sections parallel to b (010). Dispersion considerable $\rho > \upsilon$. Strongly pleochroic, colorless to blue.

Occurrence: On wavellite from the tin mines of Llallagua, Bolivia.

Name: In honor of the well-known amateur mineralogist, Mr. George Vaux, Jr., of Bryn Mawr, Pennsylvania.

PARAVAUXITE

Colorless; streak white. Luster vitreous to pearly. Transparent. Form: Small prismatic crystals. Hardness 3. Specific gravity: 2:30.

Composition: FeO. Al_2O_3. P_2O_5. $6H_2O$ + $5H_2O$.

Crystal form: Triclinic. Cleavage, perfect parallel to b (010).

Optical properties: Optically+; $\alpha = 1.554$; $\beta = 1.558$; $\gamma = 1.573$; all $\pm$ .003; $\gamma - \alpha =$ .019; 2V (calculated) 35°. Sections parallel to b (010) show the emergence of an optic axis.

Occurrence: On wavellite from Llallagua, Bolivia.

SAMUEL G. GORDON
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA,
APRIL 15, 1922

[3] E. B. Fred: *Jour. Agr. Res.*, Vol. 14, pp. 317-336.

[4] P. L. Gainey: *Jour. Agr. Res.*, Vol. 14, pp. 265-271.

THE AMERICAN CHEMICAL SOCIETY

(*Continued*)

SECTION OF CHEMICAL EDUCATION

Edgar F. Smith, *chairman*
Neil E. Gordon, *secretary*

First year college chemistry: WILLIAM MCPHERSON.

A first course in general chemistry: WILHELM SEGERBLOM. A brief comparison is made of fourteen of the more modern texts in chemistry suitable for secondary schools. The results of a recent text-book survey made by the New England Association of Chemistry Teachers are given. The usual custom of starting beginners in chem-

istry on gases and gas laws is criticized. The belief that the ordinary student can get more tangible results by starting with more tangible substances is put forth. A scheme of experimentation, which was tried out at Exeter some years ago, and which starts the student on some common metals and leads up through a series of ninety experiments to a little chemical investigation of an unknown substance without the use of a conception of atoms, molecules and symbols, is described. The scheme was satisfactory from the point of view of teaching chemistry but had its limitations for those who must primarily prepare students for the college entrance examinations. A possible revision of the College Entrance Examination Board syllabus is suggested.

First year chemistry for women: MINNIE B. FISHER. Women students who take chemistry as a cultural subject, or as a prerequisite to home economics courses, should be taught in separate groups. They lack background for scientific work, will devote little time to pure science and need very careful laboratory direction and supervision. Conference periods should be arranged to clear up difficult points. The utmost accuracy in observation and recording of facts should be insisted on. Greatest cultural value is to instill into students greater respect for truth. Greater proportion of time should be devoted to study of chemical history, theory and non-metallic elements.

Metric system: EUGENE C. BINGHAM. Metric education has been too largely neglected in the elementary schools, so we need not only to instruct our students in its use, but also in the desirability of an extension of the use of the metric system. Particularly we should give an object lesson to students by buying apparatus and chemicals and selling it in metric quantities.

Methods for presenting first year chemistry: F. P. VENABLE.

The project method of teaching chemistry: NEIL E. GORDON. A project method has been worked out in the first year chemistry where the laboratory work and the text work have been very closely correlated. What the student can find out and has time to find out is not presented in the text. Blank spaces are left for inserting this material by the student, and hence the book is not complete until the student has done his part. The method has been found very efficient in training the student's power to think, ability to reason and arousing his curiosity.

Studying chemical engineering by the unit-operation method: DR. W. K. LEWIS and PROFESSOR R. T. HASLAM. A brief description of the School of Chemical Engineering Practice of the Massachusetts Institute of Technology and the methods employed in teaching chemical engineering by means of experimental work on full-scale operating equipment is given. The field of chemical engineering is divided into "unit-operations," the more important of which are flow of fluids, flow of heat, evaporation, distillation, drying, filtration, combustion, extraction, electrolysis, etc., and these unit-operations are studied quantitatively, particular attention being paid to the efficiency of the operation, how this efficiency can be improved or the losses decreased, and how the equipment can be changed to get increased production. The students in this school design, carry out and work up the results of these investigations by themselves under suitable guidance from members of the institute faculty resident at the plant, who devote their time wholly to work in the practice school. A description of the quantitative tests carried out in the study of these unit-operations is given, showing the wide scope and the fundamental character of these plant investigations.

Standardization of courses in quantitative analysis for students in chemical engineering: JOHN L. DANIEL. A study of the courses given to chemical engineering students in sixty-nine institutions shows that the time given to quantitative analysis laboratory varies from 72 hours as a minimum to 714 as a maximum. The time given to recitation work in quantitative varies from none to 270 hours. There is no suggestion of any agreement among these schools as to the proper time to give to quantitative. Teachers of this subject should confer with a view to standardizing the course so that sufficient time would be given to it to accomplish its aim and purposes and to avoid devoting an excessive amount of time to it as this crowds desirable courses out of the curriculum.

Discussion of committee's report on chemical engineering education: R. H. MCKEE.

Content of chemistry courses: L. J. DESHA. With a fixed limit to the time available for instruction in chemistry and an ever-widening science, the problem of what to omit becomes fundamental. Courses have grown by simple addition of the newer developments to the traditional content, without sufficient attention to consolidation. As a result, the student's knowledge consists chiefly of isolated facts but poorly knit to-

gether by laws and theories. Reorganization should start with a clear-cut decision as to just what we are going to try to teach in the four years available, the careful selection of the subject matter best suited to this end and the equally careful omission of extraneous facts.

Importance and time given for courses in economics and industrial management in chemical engineering training: C. S. WILLIAMSON, JR.

Distribution of time between "pure" and "applied" science: GRAHAM EDGAR.

Recent progress at Columbia University: MARSTON TAYLOR BOGERT. Certain new advanced courses in chemistry are now available for those interested. Statistics are given relating to the present student body in the department of chemistry.

Some laboratory helpers: J. N. SWAN. The planning of a chemical building is a fine piece of research work. Many problems present themselves for solution. Attention is here called to just two items as representing different fundamental ideas to be kept in mind in planning for two different things in the same laboratory. In the matter of locks for desks in the freshman laboratory the fundamental idea is to save time. Getting into a desk is wholly a matter of routine; hence a time saver is worth while. Therefore compare the time involved with different locks and, as a secondary matter, expense and trouble to the institution. In the matter of reagent bottles it has got into the minds of some that time saving is the fundamental principle. Not so, they are teachers. The time of students spent in looking at reagent bottles is well spent; therefore the bottles should be where they can be seen. The fundamental principle is to have excellent reagent bottles where they hold the attention of the student. A comparison is then made of varieties of locks and of reagent bottles.

A chart of the synthetic intermediates: CHAS. W. CUNO. A chart of the various commercial intermediates prepared from the distillates of coal tar, their type syntheses, the relation of these intermediates to one another, and their relationship to the common dyes of commerce. Three objects are in view: (1) to give the student in organic chemistry a bird's-eye view of this immense field; (2) to aid the manufacturer and commercial chemist in understanding and covering his field; (3) to show the research chemist possible gaps in present syntheses.

Training for agricultural chemistry: W. F. HAND.

Unified chemistry courses: JACK P. MONTGOMERY.

Standard tests in science, especially chemistry: H. A. WEBB. Standard tests have become adopted as a definite method in educational practice. A standard test may be defined as a method of measuring quantitatively a pupil's intelligence or his achievements in a certain branch of study. Various workers in the field of science as early as 1917 began to publish proposed standard tests in different scientific branches. The different types of tests and methods suggested up to the present time were illustrated. It is proposed by some that a type of quick, rapidly taken test be substituted for the conventional two or three hour examination which is so frequently used. The results obtained with such tests were discussed, and the advantages and disadvantages set forth. The use of standard tests in science has not been widely adopted, for none of them are standardized in the ordinarily accepted sense of the word, the whole matter being in a very experimental stage.

Science or athletics? E. G. MAHIN. The steady increase in extra-curricular activities in our colleges is believed to be largely responsible for the much discussed decline in our standards of scientific education. It is believed also that the abnormal development of commercialized intercollegiate athletics is the greatest obstacle to restriction of such activities to sane and reasonable limits. In this paper it is argued that our standards can not be materially improved until the colleges divorce themselves from commercialized athletics, and that this necessarily involves elimination of the high salaried professional coach and correction of the disproportion now existing in expenditures for athletics and for educational purposes.

SECTION OF HISTORY OF CHEMISTRY

C. A. Browne, *chairman*

Lyman C. Newell, *Secretary*

Dr. Thomas Cooper—A pioneer American chemist: EDGAR F. SMITH.

The chemical and scientific achievements of Father Athanasius Kircher, S. J.: GEORGE A. COYLE.

A book and a battery (Section of Sir Humphry Davy's battery and a volume of the complete works of Davy): J. N. SWAN.

An early type of chemical slide rule: JOHN A. GUNTON. An improved scale of chemical equivalents, dating from 1828, is described. It was designed by Beck and Henry of Albany as an im-

provement on a scale invented by Wollaston in 1814 and differs from the original in having a greater number of elements listed and also in the fact that hydrogen is taken as the radix or unit. Altogether 36 elements and 144 compounds are listed on which computations may be based. The calculation is carried out by means of sliding portion, as in the ordinary slide rule, the slider being subdivided into divisions representing the logarithmic ratios of the numbers from 8 to 330. The "equivalent weights" as given and the nomenclature are interesting from the historical standpoint.

Reminiscences of Italian chemists: WILLIAM MCPHERSON.

A few sources of information upon early chemistry and chemical industries in America: C. A. BROWNE.

Some facts relating to early chemists and chemical industries in Alabama: B. B. ROSS.

Some early southern chemists and their work: EUGENE A. SMITH.

Not much time was taken in the discussion of the papers, as the program was long without discussion. There were more than one hundred present during at least part of the time the section was in session, which was probably the largest attendance of any section at the meeting.

Quite a number of autograph letters, pamphlets, pictures and books were shown and some pieces of apparatus.

DIVISION OF ORGANIC CHEMISTRY

H. T. Clarke, *chairman*
Frank C. Whitmore, *secretary*

The preparation of methylmercuric acetate and methylmercuric hydroxide: M. C. SNEED and J. LOUIS MAYNARD. During the course of an investigation of the thermal decomposition of mercurous acetate in an atmosphere of nitrogen, the formation of a small quantity of an organic derivative of mercury was noted. This product was assumed to be methyl mercuric acetate, despite the fact that its properties did not agree with those described by Otto. Doubt was cast on the purity of his salt prepared by the action of acetic acid on mercury dimethyl at 120°. Jones and Werner have shown that, at higher temperatures, a more complicated reaction takes place with no evidence of the formation of the desired salt. The true methylmercuric acetate has been prepared by four reactions, each of a different type, none of which admits the possibility of the decomposition of the desired organomercuric salt. These methods were: (1) Action of mercuric acetate with mercury dimethyl; (2) Action of methylmercuric iodide and silver acetate; (3) Neutralization of methylmercuric hydroxide with acetic acid; (4) Action of methylmercuric hydroxide with ethyl acetate. The same organomercuric salt was formed in each of the above reactions. It was identical with the mercury derivative produced in the decomposition of mercurous acetate. The hitherto unprepared methylmercuric hydroxide required in methods 3 and 4 was obtained as a white crystalline solid by the action of moist silver oxide on methylmercuric iodide.

An electrolytic method for the preparation of mercury dimethyl: HENRY C. HOWARD, JR., and J. LOUIS MAYNARD. Although mercury dimethyl has been obtained by Kraus by the electrolysis of aqueous solutions of methylmercuric salts, the low conductivity of such solutions renders the process unsuitable as a means of preparation of the dialykyl. However, it has been found that the addition of pyridine in approximately equimolecular quantities increases the conductivity to such an extent that electrolysis becomes a satisfactory method of preparation. In the course of this investigation the conductivities of solutions of methylmercuric hydroxide and several of its salts were determined. It is interesting to note that these measurements show methyl mercuric hydroxide to be an extremely weak base. This is contrary to the statements in the literature.

The asymmetry of diazodiethylglutamate: WILLIAM A. NOYES and H. M. CHILES. While Noyes and Marvel did not succeed in obtaining optically active diazo esters in which the asymmetry was due to the carbon atom to which the diazo group is attached, Levene and Mikesha have reported the preparation of such a compound from *l*-diethyl aspartate. We have obtained an active diazo ester, $EtO_2C\text{-}CH_2\text{-}CH_2\text{-}CN_2\text{-}CO_2Et$, from *d*-diethyl glutamate by the Curtius method. The carefully purified ester is a yellow oil which boils 92-93° under a pressure of 0.1 mm. Other optically active substances which might have been present were carefully removed and the composition was established by analysis. The specific rotation at 20° for the D line is +1.68°. The specific rotation in a 10 per cent. ether solution is +4.03°. The diazo ester, in solution in ether, gives the *d*-hydroxy ester on shaking with NH_2SO_4. Saponification of the hydroxy ester gives the sodium salt of a hydroxy acid which is also dextrorotatory. It is difficult to reconcile the optical

activity of this diazo compound with the Lewis-Langmuir theory of the combination of atoms in "non-polar" compounds.

Further observations on the nitration of halogenated phenols: L. CHAS. RAIFORD and LIANG YI HO. Previous work by Raiford and Heyl has shown that the method of nitration of brominated phenols first used by Zincke is suitable for the bromine and iodine compounds, but that the nitro radical fails to replace chlorine; and that, further, both dibrominated and tribrominated derivatives of ortho and meta cresols may be expected to give isomeric nitro derivatives. The small yield (10-12 per cent.) of the para siomeride, 3-bromo-5-nitro-o-cresol, obtained when dibromo-o-cresol was nitrated in this way raised the question as to whether the position taken by the nitro radical depends more upon the relative position of the halogen atom or upon its character. To get data on this point, 3-chloro-5-bromo-o-cresol and its isomer, 3-bromo-5-chloro-o-cresol, were nitrated. In each case the bromine was displaced, giving the isomeric compounds, 3-chloro-5-nitro-o-cresol and 3-nitro-5-chloro-o-cresol.

New organic selenium compounds: MARSTON TAYLOR BOGERT and Y. G. CHEN. By the action of hydrogen selenide upon acyl anthranilic nitriles, selenoquinazolones have been prepared and studied. Derivatives of 2-phenyl benzselenazole also have been investigated and show some interesting properties.

The synthesis of a thiazole analog of cinchophen (atphan): MARSTON TAYLOR BOGERT and E. ABRAHAMSON. 2-phenyl benzothiazole is nitrated, giving the 6-nitro derivative, which is reduced to the amine, and the latter is then changed to the corresponding carboxyl compound through the diazo reaction. Various derivatives and collateral compounds were prepared. The position of the nitro group was proved by decomposition of the amine and by its conversion to the- benzobis thiazole.

Hydrocyanic acid: an ammono carbonous acid and an ammono formaldehyde: EDWARD C. FRANKLIN. From a purely formal point of view HNC represents hydrocyanic acid as an ammono carbonous acid, while the nitrile formula represents it simultaneously as an ammono formaldehyde and as formic ammonid. Sodium ammono carbonite may be nitridized to an ammono carbonate by a considerable number of methods, as, for example, by the action of sodium ammono nitrate and of cyanogen as represented by the equations, $NaNC + NaNa = NCNNa_2 + N_2$ and $NaNC + C_2N_2 = NaN(CN)_2 + C$. As an ammono aldehyde, hydrocyanic acid undergoes polymerization and condensation, forms addition compounds with bisulfites, ammonia, water and alcohol, reacts with hydroxylamine, hydrazine and phenylhydrazine, and is reducible to an ammono alcohol.

A study of the optimum condition for the formation of the Grignard reagent: HENRY GILMAN and CHAS. H. MEYERS. Two satisfactory methods for the estimation of the Grignard reagent are being used. One involves titration with standard acid and the other the measurement of gas evolved when the reagent is decomposed by water. The study concerns those ordinary factors affecting the yield: rate of addition of RX, concentration of reagents, kind of magnesium, cooling during formation, refluxing after formation, stirring, kind of air protection (calcium chloride, soda lime, etc.), catalysts, etc. This preliminary report is on ethyl magnesium iodide.

The reaction between thionyl aniline and the Grignard reagent: HENRY GILMAN and HARRY L. MORRIS. In connection with a series of studies on the mode of reaction of the Grignard reagent with compounds having more than one reactive grouping, thionyl aniline ($C_6H_5N{=}S{=}O$) has been treated with several RMgX compounds. Phenyl magnesium bromide gives a good yield of the anilide of benezen sulfinic acid. Excess of the Grignard reagent gives the same compound. Up to the present no success has attended attempts to determine the mechanism of the reaction—the —MgX may have added either to the nitrogen or to the oxygen.

Arsenated heterocyclic compounds prepared from 3,4-diaminophenyl arsonic acid (amino arsanilic acid): W. LEE LEWIS and R. S. BLY. The great reactivity of the ortho-diamines with a great variety of substances yielding quinoxalines, azimides, piafthioles, imidazoles, etc., suggested the easily available amino arsanilic acid as a fruitful starting point for new organic arsenicals. 3,4-diaminophenyl arsonic acid is made by nitrating oxalyl p-arsanilic acid and reducing the nitro compound with ferrous chloride and ammonia. Thus far this compound has been condensed with benzil, oxalic acid, pyruvic acid, maltosone yielding the following: 2,3-diphenyl-quinoxaline-6-arsonic acid, 2,3-diketoquinoxaline-6-arsonic acid, 2-methyl-3-hydroxy-quinoxaline-6-arsonic acid, and 3-(glucosido-erythrityl)-quinoxaline-6-arsonic acid.

Derivatives of the beta-chloro-vinyl arsines: W. LEE LEWIS and H. W. STIEGLER. The chloro-

vinyl arsines were prepared by the action of acetylene upon arsenic chloride in the presence of aluminum chloride and were separated by fractionation under reduced pressure. The following derivatives were prepared: Beta-chloro-vinyl arsenious oxide, beta-chloro-vinyl arsonic acid, beta-chloro-vinyl di-iodo arsine, beta-chloro-vinyl bibromo arsine, hydrated bis-beta-chloro-vinyl arsenic acid, bis-beta-chloro-vinyl arsenious sulfide and bis-beta-chloro-vinyl arsenious oxide.

Chemical and crystallographic notes on the acid phthalates: FRANCIS D. DODGE. The use of potassium acid phthalate as ultimate standard in alkalimetry was suggested by the writer in 1915. This salt and the corresponding salts of sodium, ammonium, lithium and magnesium have since been more carefully examined. Acid salts of the formula, $2MHC_8H_4O_4 . C_8H_6O_4$ (M = K, NH), were also observed. The acid phthalates crystallize remarkably well, and invited further study. The potassium, sodium, ammonium and lithium salts have been measured. The potassium and ammonium salts are isomorphous, and also show an interesting isomorphism with the corresponding salts of ortho-sulfo-benzoic acid. The rubidium and cæsium salts were also prepared, and appear to belong to the same isomorphous group. In optical properties, the crystals of the potassium and lithium acid phthalates proved interesting, as they exhibit crossed axial plane dispersion toward the violet end of the spectrum. The same variety of dispersion is also very well shown by the mixed crystals of potassium and rubidium acid phthalates.

The occurrence of formic acid in essential oils: FRANCIS D. DODGE. A crystalline sediment which had been deposited in a zinc lined container of oil of geranium was found to be zinc formate, and its occurrence was explained by the presence of formic acid in the oil. This acid, in combination with the alcoholic compounds as esters, is apparently a normal constituent of the oil, the amount of ester, calculated as geraniol formate, ranging from 9 to 13 per cent. A method was devised for the determination of the acid in oils, and a number of the latter were examined. The relatively large amount of formic ester found in oil of geranium seems to be characteristic, and the determination may be of service in the technical valuation of the oil.

Catalytic reduction of the C=N complex: DEWITT NEIGHBORS, S. M. CLARK, J. E. MILLER, A. L. FOSTER and J. R. BAILEY. Lochte and Bailey have recently applied the catalytic method employing colloidal platinum to the reduction of dimethylketazine, $Me_2C{=}N{-}N{=}CMe_2$. This reaction has been successfully applied to the reduction of acetone semicarbazone to i-propylsemicarbazide, of menthone semicarbazone to menthylsemicarbazide, of camphor semicarbone to bornylsemicarbazide, and of acetaldehydephenylhydrazone to phenyl hydrazoethyl. The investigation of i-propylsemicarbazide has been completed. Among the salts prepared are the hydrochloride and the oxalate. Other derivatives made are the nitroso and benzoyl compounds. The latter with caustic soda yields the corresponding i-propylphenylhydroxytriazole. With 80 per cent. H_2SO_4 i-propylsemicarbazide hydrolyzes to i-propylhydrazine, previously obtained by Lochte in the reduction of acetone hydrazone. Oxidation of the semicarbazide with permanganate in either acid or alkaline solution gives 2-carbonamidoazopropane, $NH_2{-}CO{-}N{=}N{-}CHMe_2$, along with acetone semicarbazone. The azo compound readily undergoes rearrangement to the hydrazone.

The preparation of mono- and parabromacetaldehyde and their application to synthetic work in cellulose chemistry: HAROLD HIBBERT and HAROLD S. HILL. These substances have been prepared in a state of purity and have been applied to the synthesis of a variety of substances closely related to the polysaccharides.

The electrolytic reduction of crotonaldehyde: HAROLD HIBBERT and ROLAND R. READ. Using a lead cathode, the principal product is an unsaturated cyclic aldehyde, apparently 4-aldehydo-2, 3-dimethyl-2, 3-dihydro-R-pentene (cyclopentadiene). The authors discuss the mechanism of this reduction and see in it valuable evidence for Nef's vinyl alcohol theory of the aldol condensation.

Preparation and properties of 1-mercaptobenzothiazole and its derivatives: L. B. SEBRELL and C. E. BOORD. The preparation of this substance from thiocarbanilide and sulfur, from aniline, carbon disulfide and sulfur, and from both the zinc and ammonium salts of phenyldithiocarbamic acid and sulfur were carefully studied and compared as to yield, purity of product, etc. This work was extended to the methyl derivatives of 1-mercaptobenzothiazole, heretofore unknown, and their preparation and properties described.

Absorption spectra of phenylazophenol and its derivatives in the visible region: C. S. ADAMS and C. E. BOORD. The absorption spectra of azobenzene, phenylazophenol, and the substitution products of phenylazophenol were studied in both alcoholic and alkaline solutions. The shift in the absorption band due to position isomerism, variation in the dye concentration, changes in the

solvent, changes in the nature and concentration of the alkalies used were carefully noted and the results recorded as extinction curves. The work includes the methyl, chloro, bromo, iodo, nitro and hydroxy derivatives.

The condensation of primary aromatic arsines with aldehydes: C. S. PALMER and ROGER ADAMS. It has been found that primary aromatic arsines react with aldehydes in three ways, depending on the condition. These may be illustrated by the equations: (1) $RAsH_2 + 2H\text{-}CH = RAs(CHOHR)_2$; (2) $2RAsH_2 + 4R\text{-}CHO = RAs\begin{smallmatrix}O\text{-}CH\text{-}R\\ \diagdown\quad\diagup\\ As\text{-}R\\ \diagup\quad\diagdown\\ R\text{-}CH\text{-}O\end{smallmatrix} + 2R\text{-}CH_2OH$; (3) $2RAsH_2 + 2R\text{-}CHO = R\text{-}As{=}As\text{-}R + 2R\text{-}CH_2OH$. The first reaction proceeds by treating the arsine with the aldehyde at room temperature with a little concentrated hydrochloric acid as a catalyst. The products are high-boiling oils, or in the aromatic series, solids. They are stable to water, alkalies, and cold dilute acids; they oxidize readily to give the aryl arsonic acids and aldehyde; they react with many other reagents as though they consisted of a mixture of the aldehyde and the arsine; they form addition products with chloroplatinic acid. The second reaction proceeds by treating the arsines and aldehydes with anhydrous hydrogen chloride, or by treating the compounds obtained by reaction (1) with hydrogen chloride, acetyl chloride, or acetic anhydride. Alcohol is evolved and 1, 4, 3, 6-dioxdiarsines are produced having the structure given above in equation (2). These products do not form when aromatic aldehydes are used. The third reaction proceeds by heating the arsine with the aldehyde at a high temperature with or without hydrochloric acid or at a low temperature without hydrochloric acid.

Organomercury compounds formed from salicylaldehyde and its nitro derivatives: EDMUND BURRUS MIDDLETON with FRANK C. WHITMORE. Calicylaldehyde, since it is not readily oxidized and contains a phenolic hydroxyl, can be mercurated with mercuric acetate. The principal product is 3, 5-diacetoxymercuri-salicylaldehyde. Using an excess of the aldehyde in water solution gives a mono-acetoxymercuri-salicylaldehyde, although the chief product is still the dimercurated compound. 3-nitro- and 5-nitro-salicylaldehyde react with mercuric acetate in alcohol to give mono-mercurated products. The sodium salts of these compounds are highly colored and soluble. Oxidation changes the mercurated aldehydes to the corresponding acids. The mercurated aldehydes have been condensed with the following amines: aniline, p-toluidine, anthranilic acid and p-aminobenzoic acid. The mercurated salicylaldehydes are decomposed by aqueous inorganic iodides giving inorganic mercury compounds, alkali and the unmercurated aldehydes.

Organomercury compounds formed from benzenesulfonic and benzylsulfonic acids: FRANK C. WHITMORE and LOUIS EHRENFELD. Benzenesulfonic acid in aqueous solution dissolves mercuric oxide readily. Evaporation of the resulting solution does not give the expected mercuric salt. All the mercury is then attached to carbon, the product apparently being a mixture of at least two organic mercury compounds. Benzylsulfonic acid dissolves mercuric oxide and changes to an organic mercury compound even on gentle warming. The product contains only one substance. The position of the mercury is to be determined. The remarkable ease of mercuration of these sulfonic acids is without parallel among aromatic compounds which contain no "activating group" such as —OH or $—NH_2$. Preliminary report.

Mass action in the preparation of compounds of urea with acids and salts: JACK P. MONTGOMERY.

Mononitro derivatives of the benzoic acid esters of the trihalogen tertiary butyl alcohols. T. B. ALDRICH and JULIA E. BLANNER. Through the interaction of o-, m-, and p-nitrobenzoyl chlorides and trichloro tertiary butyl alcohol and tribromo tertiary butyl alcohol, the six possible esters have been prepared. Nitration of the benzoic ester of trichloro tertiary butyl alcohol gives a nitro ester which is identical with the product obtained from m-nitrobenzoyl chloride. The nitro esters crystallize from alcohol in the form of colorless plates or needles. They are insoluble in water, but readily soluble in organic solvents; are not readily saponified; are practically odorless and tasteless; and can be reduced to amino compounds. They are not as active physiologically as the alcohols from which they are prepared. Possibly this is due to their insolubility.

Some reaction products of malonic ester and cyclohexane derivatives: E. C. KENDALL and A. E. OSTERBERG. Cyclohexane ethoxyglycol was prepared from ortho-chloro-cyclohexanol and sodium ethylate in alcohol. This substance heated with malonic ester replaces one or both ethyl groups according to conditions. The disubstituted product heated with malonic ester gives the monosubstituted compound. Ortho-amino-cyclohexanol reacts

with malonic ester with either one or both groups. The amino group is first substituted. The methylene hydrogen atoms of the malonic residue in this compound are easily replaced by chlorine. Sodium ethylate and alcohol react with this to form "dichloracetyl of ortho-amino-cyclohexanol." The reaction product between amino-cyclohexanol and malonic ester in which both groups react with the ester at a high temperature reacts in such a manner that two molecules combine with an acetal linkage.

The alkylation of aniline: A. B. BROWN and E. EMMET REID. Mixtures of aniline vapor with methyl, ethyl, propyl and butyl alcohols have been passed over special silica gel at from 300 to 450°. This substance is an efficient catalyst for this reaction, though its activity falls off with time. In all cases the product is chiefly the monoalkyl derivative. The optimum temperature is from 365 to 395°. At the start 43 to 51 per cent. of alkyl anilines are produced with one equivalent of the alcohol and 68 to 70 per cent. with two equivalents, except in the case of butyl alcohol, where an excess is of little advantage.

The amination of alcohols: A. B. BROWN and E. EMMET REID. An extensive study has been made of the conversion of methyl, ethyl, propyl and butyl alcohols into the corresponding amines by passing their vapors mixed with ammonia over various catalysts at different temperatures up to 500°. The optimum temperatures and percentages of the primary, secondary and tertiary amines formed have been determined for the different catalysts. The best catalyst so far found is a specially prepared silica gel.

The alkylation of benzene: T. M. BERRY and E. EMMET REID. Continuing the work of Milligan and Reid, a more thorough study has been made of the alkylation of benzene by ethylene and propylene in the presence of aluminum chloride. The proportion of the alkylated benzenes in the two layers has been specifically investigated. It has been found that the higher alkylated benzenes, except the hexa-, are concentrated in the lower layer, which also contains almost all of the aluminum chloride. The absorption of propylene is relatively slow but continues till the tetra- product, at least, is formed.

Ditolyl ketene: HENRY GILMAN and CHESTER E. ADAMS. Several unsuccessful attempts have been made by others to synthesize this ketene. Azitolil, prepared by the oxidation of monohydrazi tolil, loses nitrogen when heated in benzene at 75 to 80° C., rearranging to the desired ketene. In addition to its general interest as a new type it is being used in connection with another study.

The effect of an "iso" grouping on the melting and boiling points of organic compounds belonging to various classes: F B. FLICK, H. M. CRAWFORD, R. HOYLE and H. GILMAN. In connection with some work on the structure of tetra-tolyl ethylene, a substance with an apparently "abnormal" melting point, a regularity in the boiling points of ethylenic hydrocarbons having an "iso" group was observed. The study extended to other classes of compounds having an "iso" grouping revealed certain regularities, some of which might have been forecasted.

Physiological action and chemical constitution: the replacement of the benzoyl by related acyl groups: HENRY GILMAN and RUSSELL M. PICKENS. A number of organic acids, aromatic and aliphatic, are related in different ways to benzoic acid. The physiological behavior (the present study concerns local anesthetics) of derivatives of these acids is being compared. The diethylaminoethyl and the benzyl esters of pyromucic, furyl acrylic and alpha-thienoic acids are described.

Arsenated benzanilide and its derivatives: W. LEE LEWIS and C. S. HAMILTON. Dichloro-p-arsinobenzoyl chloride was prepared according to the method of Lewis and Cheetham and condensed with various amines. With aniline there resulted p-arsonobenzanilide which, on reduction, gave p-arseno-benzanilide. Similarly there were made p-arsono-benzanthranilide and -anisidide and the arseno derivative of the latter. Further derivatives prepared are the following: p-arsono-benzoyl-p-phenetidide, its arseno derivative, di-iodo-p-arsino-benzoyl-p-phenetidide, p-arseno-benzoyl-p-xylidide, p-arseno-benzoyl-alpha-naphthylamide, and p-arsonoso-benzoyl-arsanilide.

Arsenated benzophenone and its derivatives: W. LEE LEWIS and H. C. CHEETHAM. A previous paper by the authors dealt with the condensation of di-chloro-p-arsinobenzoyl chloride with aromatic hydrocarbons and phenyl ethers in the presence of anhydrous aluminum chloride. In the present paper the work has been extended to include the preparation of the following: acetophenone-p-arsonic acid, o-carboxyphenyl arsonic acid, dichloro-o-arsinobenzoyl chloride, 4-methyl-benzophenone-2′-arsonic acid, 4-ethoxy-benzophenone-2′-arsonic acid, 4, 4′-dibenzoyl-arsenobenzene, 4-methoxy-benzophenone-2′-arsonic acid, 4-methoxy-benzophenone-2′-arsenous acid, 4-ethoxy-benzophenone-2′-dibromo-arsine, 4-methoxy-benzophenone-2′-dichloro-arsine, 4-methoxy-benzophenone-2′-diiodo-arsine, 4-ethoxy-benzophenone-2′-di-